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THE

OLIVE IN CALIFORNIA.

Varieties, Budding, Grafting, New Methods,
and General Observations.

By B. M. LELONG,
Secretary of the State Board of Horticulture.



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THE OLIVE.—PLATE No. I.



FIG. No. 1.—Picholine.

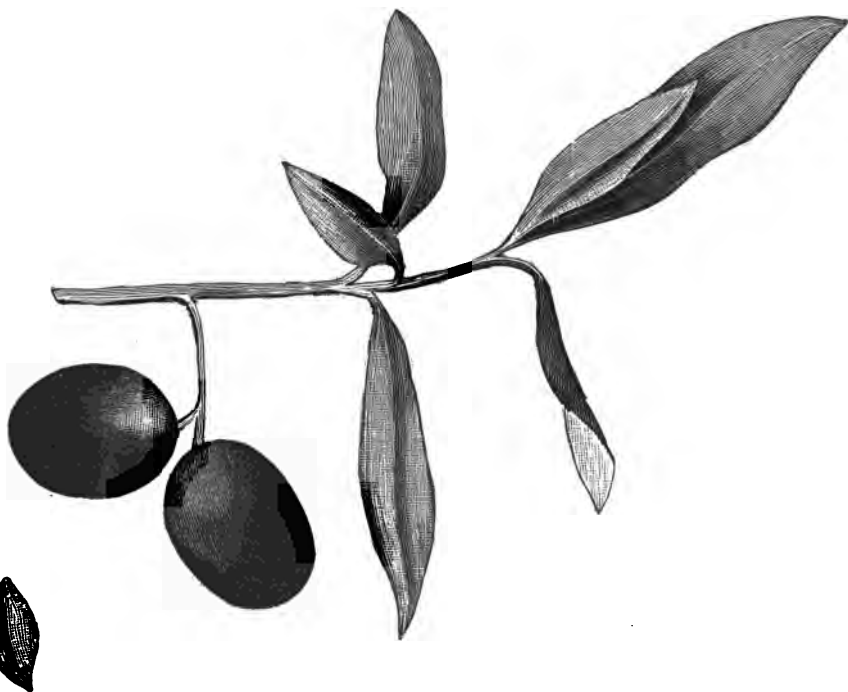


FIG. No. 2.—Saillern.



THE OLIVE.—PLATE NO. II.



FIG. NO. 3.—Rouget.

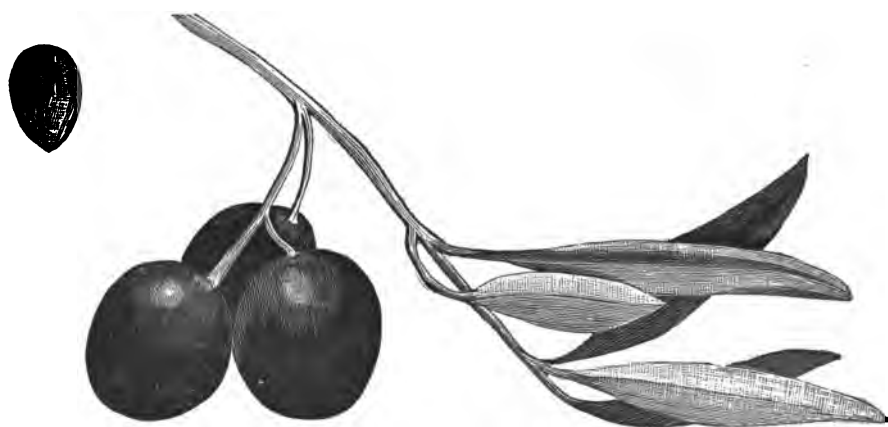


FIG. NO. 4.—Verdale.





FIG. No. 5.—Oliviere.





FIG. No. 6.—Lucques.



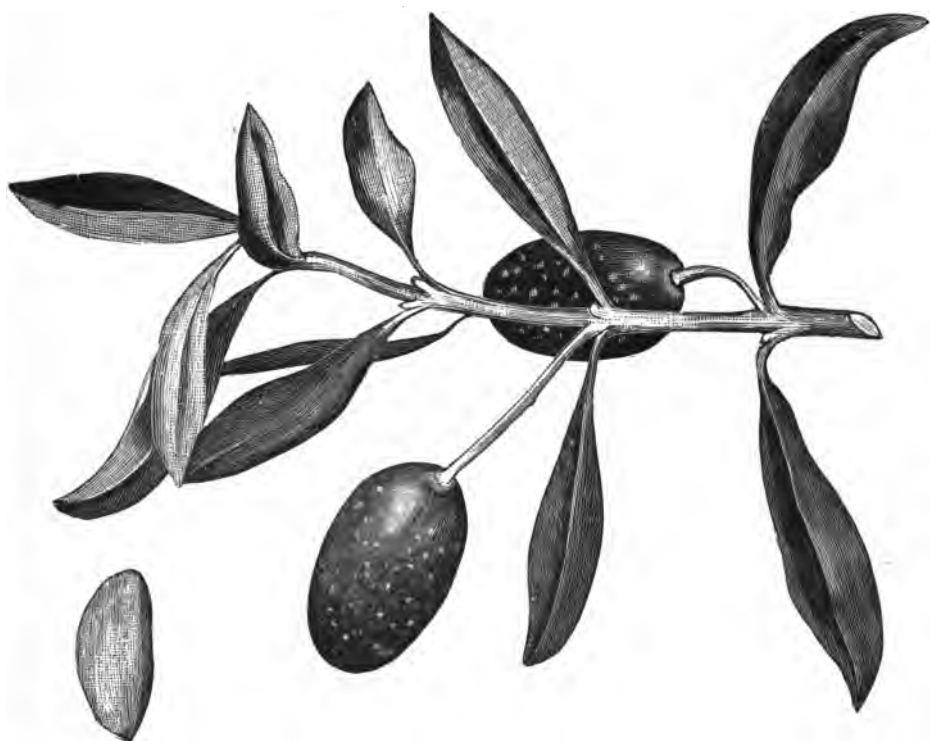


FIG. No. 7.—Pigale.



THE OLIVE.—PLATE No. VI.



FIG. No. 8.—Pendoulie.



FIG. No. 9.—Manzanillo.





Fig. No. 10.—Rubra.

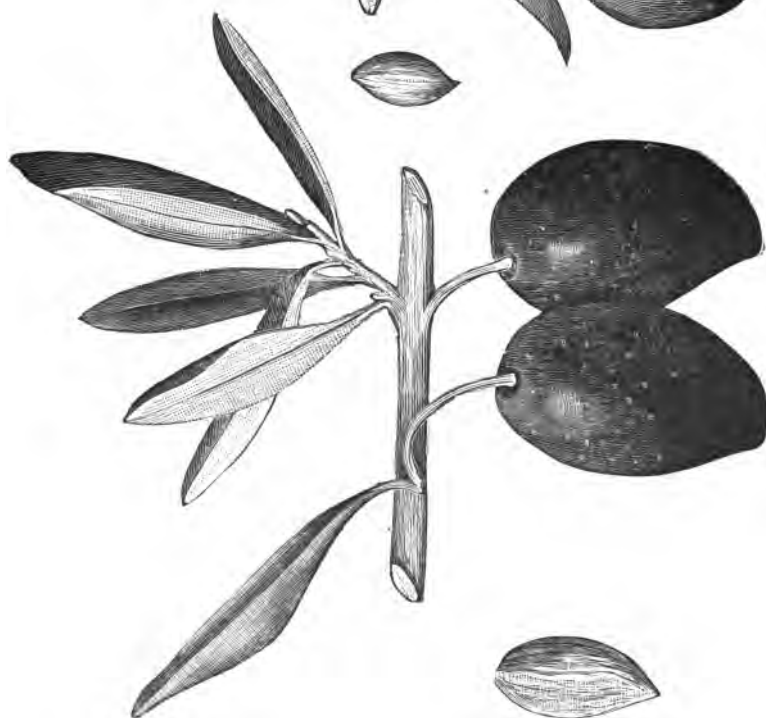


Fig. No. 11.—Macrocarpa.





FIG. No. 12.—Uvaria.



THE OLIVE.—PLATE No. IX.



FIG. No. 13.—*Atro-vialacea*.





FIG. No. 14.—Pendulina.

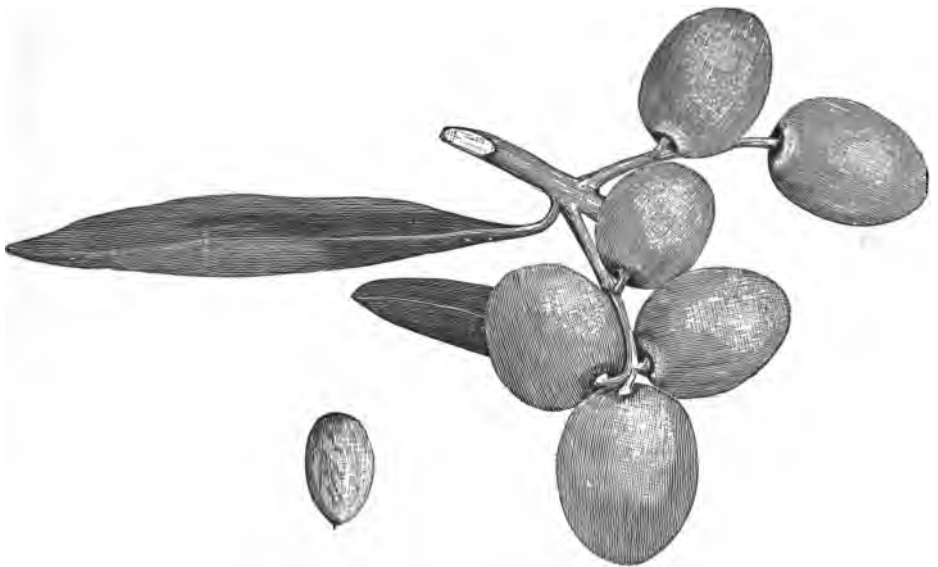


FIG. No. 15.—Columella.





FIG. No. 18.—Redding Picholine. (Cal.)
(Natural size.)



FIG. No. 17.—Redding Picholine. (Cal.)
(Natural size.)



FIG. No. 16.—Redding Picholine. (Cal.)

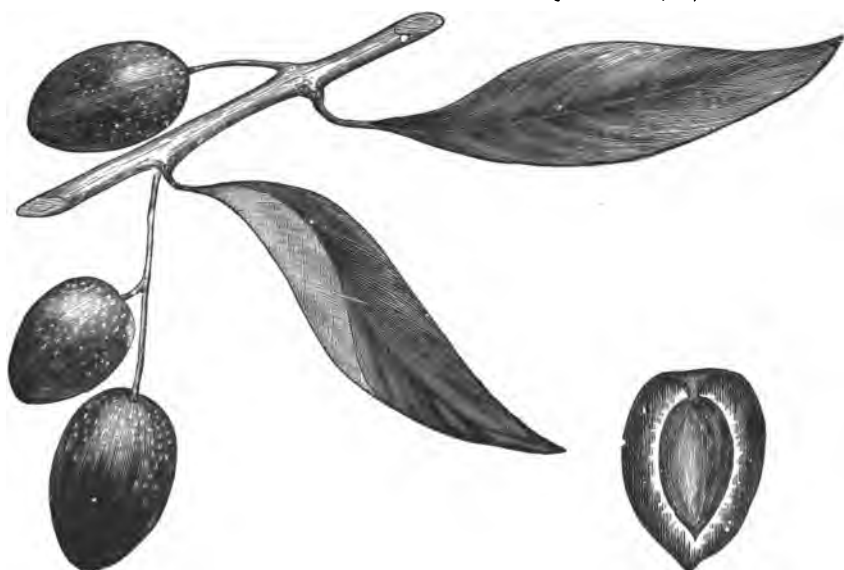


FIG. 19.—Mission.



FIG. 20.—Mission, showing size of pit and flesh.



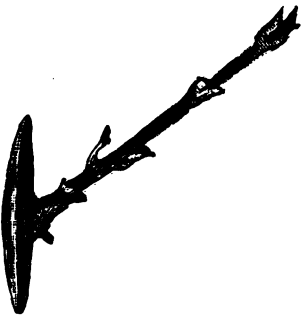


FIG. No. 22.—Twig Bud.



FIG. No. 23.—Small Twig Bud.



FIG. No. 21. The Scion.

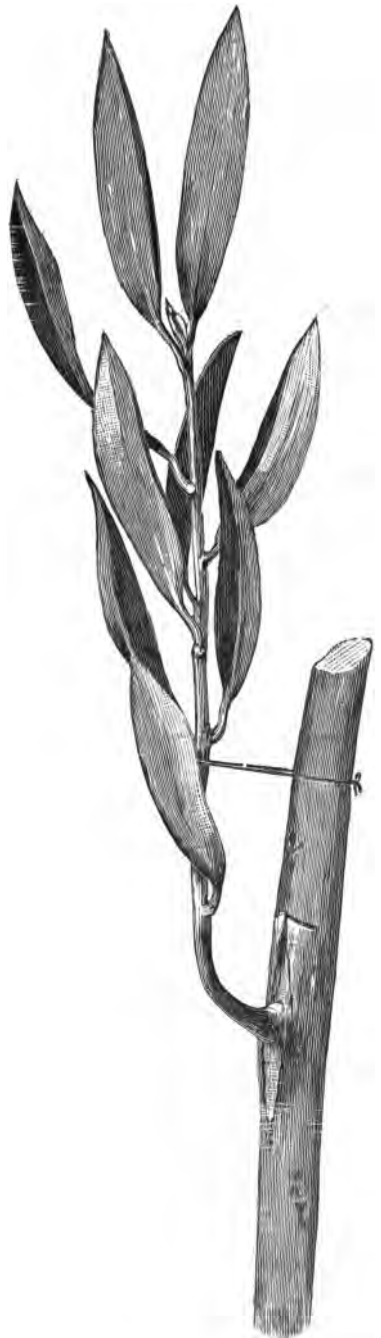


FIG. No. 24.—Started Bud, trained.





Fig. No. 25.



FIG. No. 26.



FIG. No. 27.



FIG. No. 28.



FIG. No. 29.

FIG. No. 25.—Scion.

FIG. No. 26.—New method, bud inserted.

FIG. No. 27.—Bud inserted, front view.

FIG. No. 28.—Improved method, both ends covered.

FIG. No. 29.—Started bud, trained.



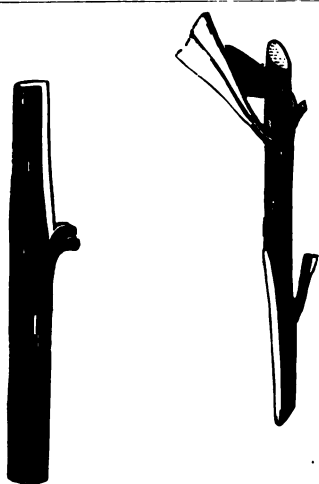


FIG. No. 32.—Graft and Stock, new method.



FIG. No. 31.—Cleft Graft inserted.

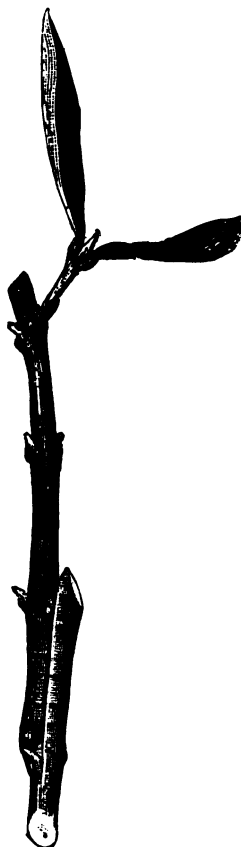


FIG. No. 34.—Graft growing.

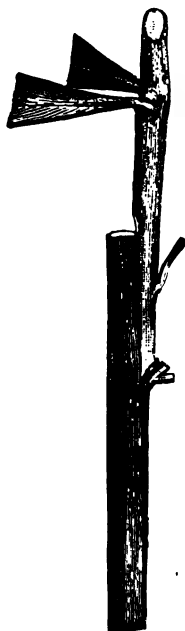


FIG. No. 33.—Graft inserted.



FIG. No. 30.—Cleft Graft and Stock.



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PREFATORY.

The olive is now more prominently before the people of California than any other tree. The merits of the varieties most largely planted have been widely discussed through the columns of the press. Only two varieties have received attention, this being due to the fact that very little has been known of other introduced varieties that have recently come into bearing. I have, within the past year, given this matter a great deal of attention, and have spared no pains in investigating anything in the olive line that has been made known to me. This investigation will be continued, and in March next the second, or revised, edition of this "Olive Bulletin" will appear with new illustrations of the later kinds, and whatever information can be obtained on the subject.

ACKNOWLEDGMENTS.

I desire to express my sincere thanks to Mr. John Rock, of Niles, Alameda County, for the very valuable assistance rendered me in my investigation, and he certainly is deserving of great credit for having introduced and distributed throughout the State mostly all the new varieties now fruiting.

My thanks are also due to Hon. Charles A. Wetmore, of Livermore, whose interests are, as every rural citizen, the welfare of the whole State. To Mr. Juan Gallegos, of Mission San José, to Mr. George E. Ladd, of Atwater, Merced County, and to Dr. J. M. Stewart, of Santa Cruz, my thanks are due for the generous aid I have received at their hands.

I am also under great obligations to Miss Bertha S. Henicke and to Miss Maria E. Wilson, engravers, No. 219 Bush Street, San Francisco, for having furnished me with the engravings so promptly, which aided me in the issuance of the bulletin without delay.

Very respectfully,

B. M. LELONG,
Secretary.

VARIETIES OF OLIVES.

VARIETIES, BUDDING, AND GRAFTING SYSTEMS, NEW AND IMPROVED METHODS, AND GENERAL OBSERVATIONS AT HOME AND ABROAD.

I append hereto a translation from the "Annals" of the National School of Agriculture of Montpellier, France, the description therein given of the varieties of olives in general cultivation there, doing so because this is the most reliable information obtainable, and as many of these varieties are now beginning to fruit in this State, that their qualities be known.

PICHOLINE.*

(Figure No. 1, Plate I.)

SYNONYMES.—Pichouline, Pecholine, Pijouline (Languedoc). Saurine, *Rozier* (Nîmes). Sausen, Saugen, Sauzin (Gard). Saurenque (Aix) Plant de Saurin, Saurine punchudo (Marseille). Piquotte, Piquette (Beziers). Coiasse ou collasse, *Reynaud*. Lacques batarde (quelques localités de l'Herault). Olivo lechin, *Tablada*. Pignola, Duhamel (Genes). Olea ovalis, Clemente. Olea europaea saurina, *Risso*. Olea europaea oblonga, *Gouan*. Olea frustu oblongo minore, *Tournefort*. Olea minor oblonga, *Magnol*.

DESCRIPTION.

Tree is of vigorous growth, but of average dimensions; its trunk is cylindrical; its bark is easily detached from the trunk in large, irregular layers; its branches extend horizontally and are of slight build; the rejection of its leaves are not numerous.

Branches not very vigorous, short, strong, inserting themselves at right angles; of a greenish, yellowish color; near the bark of a rugged nature covered with numerous protuberances which are quite visible; wood cylindrical and flattened slightly; knots few in number.

Leaves oval, lance shaped, very often enlarging themselves at the superior part; of average length; average length five and a half to six and a half centim. Width one and a quarter to one and a half centim. Top surface of a dark green color; bottom surface approaching end of leaf rather thick and of a soiled white color. Stem very thick, hard, breaking easily.

Veins, very visible from bottom.

Stem, short, very thick, very much curved toward the surface of the upper side of leaf.

Leaf Stalk, large, long, but little contorted. The leaf perceptibly flat, the edges of which are not very much curled up. The leaves accumulating in great numbers on the young branches, covering them thickly.

*A variety believed to be the Picholine is fruiting in several parts of the State under one of its synonyms of Oblonga. A full description of it will appear in the March bulletin, also observations thereto.

Fruits, generally accumulating in the direction of the branches of the year (yearly branches), isolated or grouped by twos on the leaf; stalklet very short.

Fruit Stalk, very large, short, inserting themselves in a rather large depression of the fruit. Stigmate persistent in an umbilic not very visible.

Olive, a trifle below the average size, length two and one half to three centim., width one to one and one fourth centim. Of elongated form, but large near the fruit stalk, with a tendency of tapering itself towards the point; rather symmetrical. Strongly fortified on one side at a point not attached. Intermediate form between varieties Oliviere and Lucques. The fruit changes (passes) in color from light green to wine red, then to red black. The surface carries a number of spots, specks, variegations sufficiently visible. Little like a plum.

Skin, fine, pulp abundant, of a dark red color, fleshy.

Kernel (pit), small, very elongated, pointed at both extremities, with a more pronounced curvature than is generally found in most olives. Tree of average maturity.

OBSERVATIONS.

The Picholine is widely known (spread) in certain parts of Province, particularly so in the neighborhood of Aix, Tarascon, Marseille. One likewise encounters it again frequently in Languedoc, but only by its name, as it is only a secondary variety there; perhaps also in some localities of the department of Gard. It is a variety yielding a good and regular production, being rather hardy (rustic), it is able to stand severe amputations, to which it has been subjected at Hante Province. It is cultivated sometimes for its oil, but much more often for the purpose of having the fruit picked green, having its commercial value in view as a (pickle) preserve. The Picholine is a very delicate olive, as much prized as the Olive "Verdale" for table use, and which is sold often under the name of "Lucques," but resembling it a little only in form.

SAILLERN.*

(Figure No. 2, Plate I.)

SYNONYMS.—Saillerne (Nimes). Sargene. Olea minor, rotunda, rubro-nigrigans, Turnefort, Olea Atro-rubens, Flor, Monsp.

DESCRIPTION.

A very hardy tree, middling or tall, spreading out; trunk very big, enlarged at the base; the bark comes off lengthwise in thin strips of blackish color; the main limbs are horizontal or slightly set up; shoots very numerous; it is one of the varieties which put forth the greatest number. Branches pretty vigorous, generally in limited quantity, big, much bulged out at the insertion, of dirty yellow color, longitudinally striated and covered with apparent and pretty numerous freckles; wood decidedly canaliculate; knots little prominent.

Leaf, lanceolate, regular, short, relatively large (mean length six to seven centim., width one and one quarter to one and one half centim.); upper face shining light green, a little wrinkled; under face covered with a dirty white coating pretty abundant. *Limbs* not very thick,

*Fruited in this State this year under one of its synonymes of Atro-Rubens.

flexible; nerves well delineated on upper face. *Mucron* well marked on the wide point of the leaf; hard, short, bent round. *Petiole* big, short, bent over, bringing the leaves upon one another on the same side of the branch.

The leaf is nearly flat, the edges but slightly drawn back. The cover of the tree, little provided with leaves, on the inside is always tolerably thin.

Fruits, for the most time insulated, occasionally grouped in twos, on two-year old branches. *Peduncle* long (fruits hanging down), inserted in a light depression of the fruit; stigma persistent in a well marked umbilic.

Olive, pretty small (length, one and one half to two centim., width one to one and one quarter centim.), nearly ovoid, a trifle oblong, slightly bulged out on one side. The fruit is deep black when ripe and very hoary; skin thin; pulp not abundant nor fleshy, juicy, colored a deep vinous red; pit big, of same form as the olive; tree of middling maturity.

OBSERVATIONS.

The *Saillern* is pretty much cultivated in Province, principally about *Aix*, and in *Languedoc*.

It is a delicate tree, sensitive to cold, and consequently not many old plantations of this kind can be found. It is nevertheless a meritorious variety, especially on account of the excellent quality of its oil. It brings out fair crops, bears most every year, and deserves to be propagated in the situations and localities where the winters are never very severe. The *Saillern* is almost exclusively grown for the sake of its oil.

ROUGET.*

(Figure No. 3, Plate II.)

SYNONYMES.—Rougette (Montpellier, Beaucaire). Rousseoun (Avignon); Marvaillette (Manosque). Pigan or Rougette, Laure (Bouches-du-rhone). Vermillan (Gard), (?) Caillose, Cayonne, Rougeolle (Toulon). *Olea rubicans* (Rozier).

DESCRIPTION.

This tree is hardy, half erect, and a rapid grower under favorable circumstances; trunk cylindrical, canaliculate; bark blackish gray, wrinkled; the main limbs are either horizontal or upright; the forms of a vase or a ball are the most favorable to its development; shoots very numerous.

Branches, numerous. even on the old wood, hardy, long, thin, horizontal or semi-erect, of a dull gray, wrinkled, covered with many small, regularly distributed freckles; wood irregularly furrowed, even on old branches; knots prominent.

Leaf, lanceolate, pretty short, large (mean length five and one half to six and one-half centim., width one to one and one fourth centim.); upper face deep green, with pretty numerous punctures stamped on the edges; under slightly coated, greenish white; limbs thick, with edges slightly drawn back; nerves little marked on both faces; mucron tender, little prominent, but well defined in the plane of the leaf.

* Fruited this year under one of its synonyms of Cayonne.

Petiole, short, very thick. The leaves are very numerous and the cover thick, of deep color; inserted perpendicularly on the branches, the leaves present out their upper face; the result is that the tree is of a deep hue, and can be recognized readily at a distance.

Fruits, distributed on the whole length of the two-year old branches, more numerous at the base; isolated or in groups of two, three, or four.

Peduncle, pretty long, big enough, entering into a shallow depression; stigma little apparent. Olive under middle size or small (length one and one half to two centim., width one to one and one fourth centim.), ovoid in form, narrowed in towards both ends; the fruit remains light red for a long time, then turns to a reddish black; some olives remain red till the general ripens, hence its characteristic name of *Rouget*. It is speckled with pretty numerous dots well marked on the red or reddish background; not very hoary; fruit rather shiny; skin pretty thick; pulp fleshy, colored by an abundant vinous red juice; pit middling or small, of elongated ovoid form; very late variety.

OBSERVATIONS.

The *Rouget* is altogether a very hardy variety, and very precious for propagation in poor land. It thrives in the *garrigue* (waste lands) soils of *Herauld* even in the midst of calcareous rocks, where it would seem no vegetation could exist. Under such very unfavorable conditions the *Rouget* develops to a satisfactory size, and bears regular crops. In the *garrigues*, covered by a layer of mellow land more or less gravelly, the *Rouget* bears most every year, and abundantly. The frosts of the very severest winters have spared this variety, and very important plantations can easily be found, the age of which certainly exceed two hundred years on an average. It had multiplied greatly in Languedoc before the development of vineyards. The *Rouget* yields an oil of fair quality. A great quantity of this oil is consumed in the form of pickles. For the latter use they are gathered up when yet reddish.

VERDALE.*

(Figure No. 4, Plate II.)

SYNONYMS.—Verdaou, Verdau, Vereau, Aventurier (Frejus). Calassen (Lorgues, Var.). *Olea veridula*, Gouan, Flor. Monsp. *Olea media rotunda viridia*, *Tournefort*. *Olivo verdago*, *Tablada*.

DESCRIPTION.

This tree is of dwarf habit, half erect and has little vigor; trunk thin, short, conical, canaliculate, with bark rough and greenish-gray; branches slightly drooping, principally those at the top of the tree; the tree has the general form of a ball, with a light cover; the roots do not penetrate at a great depth, and the tree is frequently rooted out by strong winds. Shoots scarce, easily grafted.

Branches are not numerous, upright or slightly inclined, inserted at a right angle, of a dirty yellow or light yellowish gray color; freckles scarce and dim; knots pretty prominent.

* Fruiting in several parts of this State. At Saratoga it is in bearing on very steep side hills, so steep that they can hardly be cultivated. The trees this year were full of fruit and doing well.

Leaves, linear, short, very narrow, well characterized by their feeble dimensions. (Length, four to six centim.; width, one half to three quarters centim.)

Nerves, very prominent, of light green; edges drawn back and forming a regular well marked channel. *Murcon* not detached, little prominent, little acute, situated in the plane of the leaf, slightly inclined in the direction of its curvature; upper face dull light green, a little wrinkled; under face dull white; limb of medium thickness; petiole short, thin, bent round so as to bring the upper faces of opposite leaves together; all the leaves are situated in the same plane on the branch, and frequently form with the latter a very acute angle.

The leaves are pretty numerous at the ends of the branches, scarce elsewhere; cover of the tree light.

Fruits isolated, never gathered in great numbers, with peduncle of middling length, thin, dirty green, inserted into a shallow depression; big, nearly round, slightly truncated at the top *infundibuliform* (funnel-shaped); very green till nearly ripe, then of a vinous red, and finally of a deep black, somewhat dull; very hoary at maturity: olive soft, with pretty thick skin; pulp fleshy and little juicy; pit very big, of same form as the olive, with surface but slightly furrowed; very early.

OBSERVATIONS.

The Verdale is much cultivated in Languedoc, notably about *Montpellier*, *Beziers*, and in *Gard*; it is exclusively cultivated in some communes (for instance at Aniane, Herault), where green olives for table use are prepared on a large scale. The Verdale is also found in *Vaucluse* and in *Bouches-du-Rhone*, but not so extensively as in *Languedoc*. It is a very early olive, but little productive of oil; it also roots pretty quickly when fully ripe. On the other hand, the *Verdale* deserves to be propagated when green olives are wanted, for it is a nice olive, generally much appreciated for the table, and is the subject of a very important trade; it must, however, be set out only in good ground, or in ground of medium quality, as its productions fall out in bad soil. The Verdale is pretty sensitive to cold, and the dropping off of the olives frequently diminishes the crop.

OLIVIERE.

(Figure No. 5, Plate III.)

SYNONYMES.—Ouliviere, Oulliviere, Oulivieira (Herault). Pointue (Herault); Pouchudo-barralenquo (Provence). Gallinenque, Galinenque. *Rozier*, *Amoreux* (Languedoc). Liviere, Laurine. *Rozier*. Michelenque. *Amoreux* (Gard). (?) Bouteyenque. *Amoreux* (Beaucaire). Plant d'Aiguieres. *Amoreux* (Marseille). Angelon Sage Reynaud (Gard). (?) Ouana (Roussillon). *Olea europaea media oblonga angulosa Gouan* Flor. Monsp. *Olea europaea laurifolia*. Risso. *Olea fructu majusculo et oblongo*. *Tournefort*.

DESCRIPTION.

This tree is hardy, never of a very large size, and spreads out; trunk cylindrical; bark blackish gray, full of fissures about the trunk and heavier limbs; comes off in short regular strips; the heavy limbs are either horizontal or inclined downward, their many branches falling to the ground; the whole tree looks like a cylinder much broader than high; has usually but few shoots.

The young branches are vigorous, bent round, spirally arranged, and grow out at an acute angle; they change from a clear ashy gray to a blackish gray after the first year; the wood quite quadrangular at the outset becomes cylindrical as the branches grow older; besprinkled with light brown freckles, slightly striated; medium size knots.

Leaves oblong, oval, lanceolate, large to very large (mean length eight to nine centim., ten to eleven centim. in exceptional cases; mean width one and one quarter to one and a half centim. up to two centim. on the hardier stock). Upper face of shining light green; thick, even white coating on lower face; limb thick, with edges much drawn back, forming a channel; nerves appearing only on upper face; mucron long, acute, bent round toward the under face of the leaf; petiole middling, inserted at a very acute angle, especially at the end of the branches where the leaves are habitually accumulating.

The leaves are very numerous, and the cover of the tree thick; they are, besides, drawn up, presenting out their under surface, so that when seen at a distance the tree has a very peculiar whitish appearance.

Fruits gathered up at the base of two-year old branches; almost exclusively on drooping, seldom on dressed, branches; often in groups of two and three; peduncle long, of middling thickness, entering the fruit in a rather deep depression; stigma little apparent in an umbilic little marked at the point of the fruit; olive of medium size (length one and one fourth to two and one fourth centim., width one to one and one half centim.), flattened out at the insertion; of cylindro-conical shape, but slightly bulged on one side; little elongated and ending abruptly by a prominent and well delineated point, hence the characteristic name of *pointue* (pointed) under which it is known in certain localities. The fruit changes from green to red, and finally becomes, at maturity, of a bluish black color, with a few spots of dark red; it is dimly dotted, hard when ripe, and very hoary; thin skin; pulp whitish, colored by dirty red and not abundant juice; pit pretty large, of the general form of the olive, with wrinkled surface, and a very sharp point; tree of second maturity.

OBSERVATIONS.

The Oliviere is one of the most ancient varieties of olive trees, cultivated in certain parts of Languedoc. *Amoureux* states this fact in his *Traite de l'Oliviere*, published at the end of the last century: "The *Ouliva pounchuda* is one of the most common around *Montpellier*, and it is almost the only one to be seen about *Narbonne*, and throughout *Languedoc* as far as *Beziers*."

There are but few of these large plantations remaining to-day, but the Oliviere, either alone or mingled with other varieties, may be found in almost every place where the land owners have preserved trees enough for their supply of oil, so that if the Oliviere can not be considered the most cultivated variety, it is the most widely spread in Languedoc. It exists also in Provence, in Roussillon, in Algeria, and in certain parts of Italy and Spain.

The *Oliviere* is a very hardy tree of great longevity, sturdy, and withstands without much injury the most severe frosts. This opinion is shared by *Rozier Laure*, who, considering this variety as sensitive to cold; has undoubtedly made his observations in damp regions, where it was commonly met with in former times.

The *Oliviere* grows to perfection only in a rather rich soil. In soils that are too dry or too poor quality, its vigor lessens; its production is affected and it becomes then inferior to more robust varieties. In suitable ground the *Oliviere* is very productive, it bears abundantly and most every year.

The quality of the oil expressed from the *Oliviere* varies greatly according to the nature of the soil where it is grown; good when grown in gravelly or light soil; the oil is, on the other hand turbid, that is, full of sediment, when coming out of damp or rich lands. In the latter case it is little liked for table use. Owing to its vigor the *Oliviere* withstands without much inconvenience severe pruning and even the heavy amputations to which it is at times subjected. The old wood gives new shoots easily and can very well be grafted. Most of the hardy varieties, however, possess the same qualities.

LUCQUES.*

(Figure No. 6, Plate IV.)

SYNONYMES.—Olive de Lucques, Lucquoise (Basses-Alpes). Oliverolle (Beziers). Odorante. *Olea minor*, *Lucensis*, *fructu oblongo, incurvo, odorato* (Tournefort). *Olea europaea ceraticarpa* (Clemente).

DESCRIPTION.

Tree of middling vigor and development; semi-erect; cylindrical trunk; the bark comes off easily in long strips, so that the trunk is often almost entirely laid bare; the main limbs are either horizontal or erect; as a whole, the tree habitually takes the shape of a vase, a ball, or sometimes of an umbrella, according to the mode of trimming; shoots scarce; branches hardy, long, straight, erect, or horizontal; young branches pretty numerous, situated upon the limbs at a right angle, generally drooping, of a decided gray color, longitudinally striated and covered with great number of freckles; wood of hexagon form, especially at the end of young branches; prominent knots.

Leaf, sublinear lanceolate, pretty long, but narrow (mean length six to nine centim., width three fourths to one and one fourth centim.); upper face light green, dull, somewhat wrinkled; under face covered with a dirty white thin coating; limbs not very thick; nerves little marked, even on upper face; *Mucron* acute, short, bent round in the plane of the leaf; *Petiole* long, thin, bent round. The leaf is drawn back at the edges, it is unequilateral, and assumes the shape of a very much elongated crescent, ending by the *Mucron*; the cover of the tree is pretty light, owing to the limited number of leaves, their relative smallness, and the divergent disposition of the branches.

Fruits often insulated, distributed for the most part at the base of the young branches; *Peduncle* long, thin, entering into a shallow depression of the fruit; *Stigma* persistent in a well marked umbilic; olive pretty big (length two and one half to three centim., width one and one fourth to one and one half), of the form of a crescent or a keel, having both ends bent round, and the opposite side to the curvature nearly rectilinear, which makes it of a very peculiar shape. The fruit changes from a light green to shining bluish black; very little hoary; the surface is slightly speckled; thin skin; abundant pulp;

* Now fruiting at Livermore.

pit pretty big, of similar form as that of the fruit, bent round at both ends, with furrowed surface, ending by two points, the lower being the sharper; fruit ripens early.

OBSERVATIONS.

The *Lucques* is not a very common variety; it is found in large tracts in France only where the propagation of olives for the table forms a special industry. It seems to have originated in *Italy*, where it grows in several places, notably at *Verona*. It is commonly found in *Languedoc*, around *Beziers*, *Montpellier*, *Nîmes*, *Lunel*, but it is little cultivated in *Provence*, except in the *Lower Alps*; it is also found in certain parts of the *Oriental Pyrenees*, whence it was brought to *Spain*.

The *Lucques* is a tolerably vigorous tree, of medium longevity. All writers who have studied this variety consider it as very enduring in cold weather and adapted for cultivation on the extreme boundaries of the olive tree region. It may be found in the most various situations, but it grows to better advantage and gives larger crops in deep, hilly lands; it is not to be recommended for *garrique soile* (waste lands), or those of poor quality, in which it gives inferior results. The production of the *Lucques* is relatively small, but this cause of inferiority is partly compensated by the beauty and excellent quality of the olives gathered green for pickling purposes. It is the most highly prized and best table olive, and it always commands the highest price in the market when gathered at the right time. The oil furnished by the *Lucques* is of very good quality, but its fruits are very seldom used for that purpose; except in cases of disease, the olives are always gathered up green, as stated above.

PIGALE.

(Figure No. 7, Plate V.)

SYNONYMES.—Pigaou (Herault). Pigalle *Amoreaux* (Montpellier), Nîmes, Beziers. Pigatado, *Amoreaux* (Narbonne). Pognue, *Amoreaux* (Grasse). Pigau, Marbree, Tiquette, Rozier, *Olea minor rotunda*, ex rubro et nigro variegata. *Garidel* *Olea variegata* Gouan. Flor. Monsp. (?) *Olea pignola*, *Risso*.

DESCRIPTION.

This tree is tall, semi-erect, and hardy, canaliculate trunk; bark grayish, knotty, coming off in large pieces about the trunk and primary ramifications.

The main limbs are most always upright or semi-erect, seldom horizontal.

It is one of the tallest olive trees of *Languedoc*, when allowed to grow without heavy amputations.

Shoots numerous and hardy.

Branches numerous, hardy, big, smooth, of dirty gray color, much swollen at their insertion, which is at an acute angle; wood slightly channeled on young branches, with small freckles, not numerous and irregularly scattered; knots little prominent.

The branches are slightly drooping in general; leaf lanceolate, rather short, large enough (mean length six to seven centim., width one and one fourth to one and three fourths), a little drawn in towards the

insertion; upper face deep green, smooth, riddled with small white punctures, very well marked (peculiar); under face greenish white; limbs thick and a little coriaceous, with edges slightly drawn back, so that the leaf has pretty much the appearance of a wide and shallow channel; nerves a little prominent on the under face only; Petiole big, short, straight, growing out of the branch at almost a right angle. The leaves are regularly distributed on the young branches, and almost perpendicular to the latter; they are numerous enough, but owing to the tree spreading out pretty much, as a rule, the cover of the tree is not very thick.

Fruits regularly distributed on the whole length of the branch, isolated or grouped; *Peduncle* long enough, big, light yellow, inserted into a deep depression; *Stigma* little apparent; *Olive* rather big (mean length two to two and one half centim., width one and one quarter to one and one half centim.); cylindrical, regular, oblong, rounded off at both ends; red at first, the fruit finally becomes a deep black; hoary to a small degree and but for a short while gets very shiny; upon this shiny background come out numerous white dots, well defined, hence its name of *Pigale*. This olive remains firm until ripe; skin thick, pulp fleshy, little juicy, colored white or light vinous red; *Pit* big, of regular shape as the olive itself; late variety.

OBSERVATIONS.

The *Pigale* is a commendable variety. Granting that its production is somewhat curtailed by its luxuriant growth of wood, the fruits are of good quality and fit for table use, as well as giving a great deal of oil of excellent quality.

The largest plantations of this variety were formerly around *Montpellier*, *Narbonne*, and *Nîmes*; some important ones are still found in the *garrigues*, of the *commune of Saint Georges*, near *Montpellier*; it is also met with in Provence, especially about *Aix*. As this olive ripens very late it cannot be gathered only late in winter, when often its surface gets wrinkled on account of the frost. It would be opportune in large plantations to mingle the *Pigale* with earlier varieties, so as to have ample time for picking.

INTRODUCED VARIETIES.

The main object in describing the varieties herein mentioned is for the purpose of identification, and in order to straighten, if possible, the nomenclature of the olive, which is a very mixed one. There are varieties now fruiting in this State known only by some of their synonymes. In one case a variety was propagated under three synonymes, and this fact was not, and could not be, discovered until the trees fruited. The fault lies with the nurserymen abroad, where so many names have been given to varieties, and in consequence thereof the identity of a certain variety by its name is very difficult, and is only known by few.

The following varieties are now fruiting in several parts of this State, and are of the earlier kinds. Other varieties and the late ones will be described, with general observations thereto, in a subsequent bulletin.

PENDOULIER.

(Figure No. 8, Plate VI.)

At the last meeting of the State Board of Horticulture (July 2, 1888,) I reported this variety as being somewhat smaller than the Mission. This was due to the fact that the trees from which the specimens were taken, and from which the cuts were made, had not been cultivated or pruned for five years.

Tree, is a beautiful one, of a vigorous growth, and of large dimensions; branches, drooping (weeping) in character; color, of wood-light green, with smooth, clear surface; it is a tree of very good production.

Fruit, large, generally accumulating singly in opposite directions, also by twos on the fruit stem; length, one and one eighth inches; width, three fourths; color, wine red, changing to deep blue black; has on the surface a number of very small white specks, which are quite visible, but very minute.

Pit (kernel), three quarters of an inch long, tapering at the upper end, broad at center, with a curve commencing about the center down to the point.

OBSERVATIONS.

At Vacaville this variety is growing in the orchard of Mr. A. Montpellier. Mr. Montpellier imported his trees from Italy in 1885. They have been planted three years; one of the trees bore fruit for the first time last year. This year all bore fruit (five trees) excepting one that has not received any irrigation. Since the trees were planted they have received very good care—they have all been irrigated excepting one; this non-irrigated tree receiving the same treatment, has made fair growth, but is not one tenth the size of the other trees, and from present indications it will be several years before it will bear. The fruit ripened in the first part of October.

At Sonoma this variety is growing in the orchard of Mr. L. P. Rixford. Mr. Rixford imported his trees from France some ten years ago. The trees four years after planting bore fruit in great numbers, and have continued to bear good and regular crops every year; they ripen at Sonoma in November. During the last five years (the place having been rented), the trees received no cultivation or pruning. Notwithstanding this, their production has been good, although the fruit has been somewhat small.

Mr. George E. Ladd, of Atwater, Merced County, has also a few trees, which bore fruit this year for the first time. They ripened there about the same time as at Vacaville.

MANZANILLO.

(Figure No. 9, Plate VI.)

Fruit, of large size, of irregular orange shape.

Color, brilliant purple, changing when mature to deep blue black, with very minute white specks.

Pit, of a peculiar shape, and different from those of any other olive. This is an early variety. I obtained specimens of it in the early part of October.

OBSERVATIONS.

At the orchard of Don Juan Gallegos, at the Mission San José, I saw several large trees of this variety that were loaded with fruit. From all appearances the tree is a rapid grower and a prolific bearer; the fruit being large makes it easy of handling. Mr. Geo. E. Ladd, of Atwater, has also a few trees which bore fruit this year, maturing there much ahead of the above named place. Dr. J. M. Stewart, of Santa Cruz, has several trees in bearing. There are also a few trees in bearing at San José, Niles, and at Santa Barbara. This olive is excellent for pickling and for oil.

RUBRA.

(Figure No. 10, Plate VII.)

This is a remarkable variety; fruit medium small, but bears heavy and regular crops. This olive is best suited for oil, but is also used for pickling. I saw trees of this variety in full bearing in the orchard of Mr. John Rock, at San José. The trees were quite large, and the limbs were very thickly covered with fruit; in fact, it was a wonder to me that the trees were able to hold the weight of such a heavy crop without being propped. At Livermore, in the orchard of Mr. Chas. A. Wetmore, I also saw trees of this variety in fruit, the trees only having been planted two years. This tree begins to fruit quite young, and is a prolific bearer.

MACROCARPA.

(Figure No. 11, Plate VII.)

Fruit very large, of light purple color, changing to red black when mature; fruits accumulate on the branches singly and in twos, in opposite directions; tree is of small dimensions, and drooping in character; the leaf is small and narrow; an early variety. The fruit is only used for pickles, to which purpose it is well suited; they contain very little oil, which is not of good quality.

UVARIA.

(Figure No. 12, Plate VIII.)

This is a valuable olive, both for pickles and for oil; fruit hangs in large clusters, of a bluish-black grape color, resembling a cluster of grapes. I have counted as many as fifteen large ripe berries on a cluster, as shown in Figure No. 12; ripens in November; a rapid grower and a very prolific bearer. I consider this variety one of the most valuable. This olive is now fruiting in San José, Niles, and Saratoga.

ATRO-VIALACEA.

(Figure No. 13, Plate IX.)

Fruit medium to large, of a deep blue-black color; tree is a vigorous grower, of a weeping habit and of good production; a most valuable variety both for pickles and for oil.

PENDULINA.

(Figure No. 14, Plate X.)

This is a handsome tree and a good bearer; fruit medium to large; ripens early. The fruit is said to produce a fine grade of oil. It is used for pickling considerably, both in its ripe and green state. This year the fruit ripened in the latter part of October. This variety is found growing in several parts of the Livermore Valley, Santa Cruz, San José, Niles, and Mission San José.

COLUMELLA.

(Figure No. 15, Plate X.)

SYNONYMS.—Loaime, Pasala, Columballa.

I consider this variety a most valuable acquisition, because of its productiveness and fruit of superior quality. The weight of the fruit generally brings the branches to the ground, unless they be propped. The fruit is of a very clear yellow color before maturity, therefore most valuable for a pickling olive. The tree is a rapid grower, of medium dimensions, stocky, and well able to support the weight of the fruit. This variety is found growing in Livermore, San José, Niles, and Saratoga. The fruit through the months of November and December retains its yellowish color, then changes to wine red, and when mature to blue black.

REDDING PICHOLINE (CAL.).

(Figures Nos. 16, 17, and 18, Plate XI.)

This little olive was introduced into this State several years ago; it is a tree of small dimensions; fruit small, of a deep blue black color; the fruit is gathered on cloths, being stripped from the limb with a hand wooden comb. The fruit makes good oil, and a sweet pickle, but is best suited as a stock. The true name of this olive is unknown. I also fail to find it described in any book on the olive; possibly in its native country it grows to better proportions than here. It does not belong to the Picholine type.

MISSION.

(Figures Nos. 19 and 20, Plate XI.)

This tree is of good production, and of very large dimensions; fruit varies in form; several types have been observed on some trees; this is somewhat peculiar, as among other varieties this does not occur. The fruit hangs on the branches singly, in twos, threes, and also in clusters; color, deep purple changing to jet black. It carries on its surface numerous white specks, but gradually they nearly disappear upon ripening; a free stone; ripens late.

OBSERVATIONS.

There are several "types" of what is known to be the "Mission" olive. Different types are found in almost every old orchard in the State. At the Mission San José, Mr. J. Rock and I discovered seven types in the Mission Orchard; some are early and some late; some are long and pointed, while others are round. At this place we discovered a tree that is different from any I have seen. That tree is over a hundred years old, and its branches were heavily laden with very large berries. The fruit is of extra large size, and very early. At the time we visited the place (November fifteenth) no green fruit could be seen on that tree. The habit of this tree is also different from any other Mission tree; it has a weeping habit, resembling a willow, having a willow-like leaf. Alongside of this tree were several other trees of the same age; the trunk of one of them measured five feet four and three quarters inches in circumference, at about four feet from the ground. All these trees receive the same care and are on the same kind of soil. The Mission is a tree of great longevity, and those trees now growing at the various Missions throughout the State, in the prime of health, over a hundred years old, are enough to substantiate this statement, therefore no comment is needed. It is a tree that has done exceedingly well in this State, and better when properly cared for, and can be found growing and fruiting in almost every county. I have seen statements published, in which the writers contend that this olive is not worth propagating, that it is the wild olive of France. How absurd these statements are, and none but the non-informed could give them utterance. To the Missionary Fathers we owe much for having introduced and planted this tree in our midst, and although they have gone beyond, from where no traveler returns, these trees stand to-day as a fit monument to them for the good they accomplished. For over a century they have furnished fruit for food, and oil to heal the sick, therefore they should be honored as upon the sacred soil in which they dwell.

BUDDING.

Budding the olive by the ordinary methods is somewhat difficult, and only about 15 to 25 per cent can be made to grow; this, however, is very much overcome by the simple methods herein given.

TWIG BUD.

This is an old and simple method practiced among florists and nurserymen with plants that are difficult to bud or graft in the ordinary way. The bud is cut, as shown in the illustration, Figure No. 21, which is the scion; the cut is made deep into the wood, in order to give the bud as much bark as possible. The leaves are partly cut off, leaving at least a half inch of the leaf on the bud to prevent the bud from drying, then, with the sharp point of the budding knife, the greatest part of the wood inside of the bud is removed, as shown in Figure No. 23. If part of the wood is not removed then the bud can not take, as the wood in it prevents the two barks (the inner bark of the bud and the inner bark of the stock) from uniting. When the wood has been partly removed from the bud, the bud is inserted into the stock, as budding is done in the regular ordinary way, and tied

tight. At the end of three weeks the string is removed and part of the top of the stock is cut back to force the bud to start. As the bud grows the foliage of the stock is gradually removed, until the bud is able to take up the entire flow of sap; it is then left to grow, and trained as shown in Figure No. 24. When the bud has grown and become stocky, what remains of the stock above the bud is cut smooth, close to the bud, to allow it to heal over. This process is performed at any time of the year when the sap flows freely. If done late in the summer the buds must be left to lie dormant through the winter. Best results are obtained when the buds are inserted early in the spring of the year, as the operation can be performed to a much better advantage, and the buds will grow to some height before the winter months set in. When inserted in large orchard trees, or in limbs of large trees, they are left to grow until they have attained such a size as will justify in the removal of the entire top.

EYE BUDDING.

This new method of "eye budding" has been brought into practice by Mr. Charles A. Wetmore, of Livermore, President of the Board of State Viticultural Commissioners, although a similar method has been practiced, but not on the olive, called ring budding, and differs from the fact that the bark of the stock is not used to protect the bud, as in this method. In this method the bud is removed (every leaf is a bud) as shown in Figure No. 25. The leaf is cut off close to the bud, then the bud is removed, as shown in the illustration (the buds do not grow where the bud is removed, as shown in Figure No. 25; this is only intended to show how the buds are removed from the scion), and a similar cut is made in the stock. The lower part is not cut, but the flap (or bark) is turned down, and the bud inserted, as shown in Figures Nos. 26 and 27. It does not matter if the buds do not fit (the bud should always be a little smaller than the space in which it is inserted). This being done, the flap (or bark) is turned up, covering the bud entirely; then it is tied tight with heavy twine. The twine for this purpose should not be less than eighteen ply. The success of the operation lies in the tying. If it should not be tied tight the bud will surely die. Mr. Wetmore found that the best way was to throw the twine in water, and tie it while wet. After the bud has been inserted two weeks, the string is removed, and a week or so after that the tree is girdled above the bud, to force it to start. This girdling consists of a ring of bark being removed from the stock, being cut an inch or so above the bud. Care should be taken not to injure (by scraping) the wood after the ring is removed, as this would kill the inner bark, and cause the tree to die back before the bud has had a chance to start. After the bud has started it is trained to the stock, and left to grow until large enough to justify the removing of the entire top, and allow the bud to become the tree.

Time of Budding.—The best time is in early spring and through the summer, when the sap flows freely.

AN IMPROVED METHOD.

Mr. Wetmore discovered that by making a cut in the shape of an H and raising the bark from the center crosscut (up and down) and

the bud inserted, as shown in Figure No. 28, that both ends of the bud became protected, while in the other method only one.

He considers this an improvement, as it also has the advantage that large buds having a large bulge at the leaf part can be used to an advantage, while they cannot in the method previously described.

OBSERVATIONS.

At the orchard of Mr. Wetmore, I saw trees of nearly every size, varying from one to six inches in diameter, that had been budded a year and two years. Some of the buds were very large and had grown to a height of about four feet, and were in trees that at the time were loaded with fruit. Mr. Wetmore intends to leave his trees bear another year, when he will allow the buds to take the place of the top; he also expects some of these buds to bear fruit the coming season, and I believe they will, because alongside of them were trees loaded with fruit, that were not as large as the growth of the buds.

GRAFTING.

Cleft Graft.—This method is similar to the one used by orchardists, only that the cut in the stock is not made in the center, as in the old way. The cut is made from either side, as shown in Figure No. 30. The graft is cut from both sides, as in the old way, to be large at the surface side and thin at the inner; then it is inserted into the stock, as shown in Figure No. 31. The graft is driven down as far as it will go, and is made to fit exactly (both barks to be even) on the surface side, the other side does not matter, as the unit of the graft and stock is on the surface side. In time, both sides heal over. After the graft is inserted it must be tied and waxed, and if the operation is performed in the field, it must be covered up with earth, leaving as little of the graft exposed as possible. The entire leaves on the grafts must not be cut off, at least one third of the leaf must be left (as shown in Figure No. 31) to prevent the graft from drying before it has had time to unite with the stock, also the entire leaf must not be allowed to remain on the graft; the trimming of the leaf prevents it from carrying off too rapidly the fluids of evaporation. In this method one point must be observed, and that is the manner in which the cut in the stock is to be made. If due precautions are not taken and the cut be made in the center of the stock, the stock will crack at the time the graft is inserted and a perfect fit cannot be had. The more the graft is pushed down into the stock the more the stock will crack below the point of the graft; this results in the loss of the entire tree.

Time of Grafting.—The best time to graft the olive is through the summer months. The operation can be performed at any time when the trees (stock) are putting forth new growth. It must be borne in mind that this method is for grafting stock close to the ground. It may do above ground, but for that purpose budding is the simplest and best.

INDOOR GRAFTING.

This method, as illustrated in Figures Nos. 32, 33, and 34, is practiced mostly indoor, in the greenhouse, or under frames. The stock is not entirely cut off, as shown in the illustration, but about one

half of the foliage is removed. The operation is performed by cutting into the stock, simply pressing the knife slightly, so that when the cut above it is made it will form at the lower part a cut in the shape of a V. This cut is made right and directly over a bud (a leaf) on the stock; this has the tendency of drawing to the graft nutritious sap, which keeps it alive, and aids it in uniting with the stock. The graft is then trimmed, leaving to it about one third of the leaves, as shown in the illustration, and inserted as shown in Figure No. 33. Care should be taken that both barks fit exactly on one side, while the other side does not matter, as it heals over in time. The graft may be waxed, if the operator so desires, but it is immaterial, unless under low heat or no heat at all. After the graft has started, the stock above the bud is cut back, as shown in Figure No. 34, when they may be removed to the open air or planted in nursery.

The above described methods of budding and grafting are very simple, and can be performed by any untrained hand.

ADVICE TO GROWERS.

At present there is considerable inquiry in regard to new varieties. Among the first questions asked is, "Which is the best variety?" I wish I were able to answer this question, but regret that it cannot be answered even if the varieties now fruiting were something of the past. The fruit grower who expects to succeed in the race of success must study for himself (which he generally does), investigate what is now being done, and not jump at hasty conclusions, as the many who have planted the Redding or California Picholine, on the advice that it was the best olive, before it had borne fruit. It is yet too early to even say which six varieties are the best, having had only this year's production. In another year much will be known, and I will do all that lies in my power in the furtherance of the investigation. All the varieties now fruiting will be subjected to a test, both for pickling and oil; the results will be given in the March bulletin. In the meantime, my advice to growers is, to plant whatever stock they can get; all stocks are good, and can be grafted or budded even after several years of growth. Enough trees of new varieties cannot be obtained, unless at very high prices, but the Redding Picholine stock is cheap, and plenty of it can be obtained; it is also very easy to raise. Afterwards it is an easy matter to graft or bud them with the buds or grafts from a few small trees.



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